

# **MAGNETIC HARD DISK RECORDING HEAD**

## **WITH SELF-COMPENSATING THERMAL EXPANSION**

### **ABSTRACT**

A magnetic head for reading information from and writing information to a hard  
5 magnetic disk having reduced thermal protrusion at the air bearing surface. In some  
embodiments, a read-head portion of the magnetic head includes one or more read insulation  
layers, and a write-head portion of the magnetic head includes one or more write insulation  
layers. The magnetic head may optionally further include one or more insulation layers  
between the read-head portion and the write-head portion. One or more of these insulation  
10 layers includes a material with a negative thermal expansion characteristic, including but not  
limited to, carbon fiber, zirconium tungstate ( $\text{Zr W}_2 \text{O}_8$ ), or hafnium tungstate ( $\text{Hf W}_2 \text{O}_8$ ).